IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Jeff EDER

Serial No.: 09/940,450

Filed: August 29, 2001

For: An automated method of and system for identifying measuring and enhancing categories of value for a value chain

Group Art Unit: 3692

Examiner: C. Graham

Supplemental Brief on Appeal

Commissioner of Patents and Trademarks
Washington, D.C. 20321

Sir or Madam:

This supplemental appeal brief is being submitted to correct the formatting of the appeal brief. The Table of Contents is on page 2 of this paper.

Table of Contents

1. Real party in interest

Asset Reliance, Inc. (dba Asset Trust, Inc.) is the assignee of 100% interest in the above referenced patent application.

2. Related appeals

An Appeal for U.S. Patent Application 09/764,068 filed on January 19, 2001 may be affected by or have a bearing on this appeal. An Appeal for U.S. Patent Application 10/645,099 filed on August 21, 2003 may be affected by or have a bearing on this appeal. An Appeal for U.S. Patent Application 10/746,673 filed on December 24, 2003 may be affected by or have a bearing on this appeal.

3. Status of Claims

Claims 34 – 52, 62 – 64, 68 – 70, 90, 91 and 134 are rejected and are the subject of this appeal. Claims 62, 68, 90, 91 and134 are currently amended. Claims 1 – 33, 53 – 61, 65 – 67, 71 – 89, and 92 – 133 are cancelled. Claims 135 – 167 are new.

4. Status of Amendments

An Amendment after a Non-Final Rejection was received on September 1, 2006.

5. Summary of Claimed Subject Matter

One embodiment of an automated method of and system for identifying measuring and enhancing categories of value for a value chain according to the present invention is best depicted in Figures 1 – 10 of the specification for the instant application. Figure 1 gives an overview of the major processing steps which include integrating data from a plurality of database management systems for use in analysis, analyzing the data as required to develop a model of value chain financial performance by element and category of value, identify and analyze value improvements and produce reports.

Independent claim 34 – One embodiment of an automated method of and system for identifying measuring and enhancing categories of value for a value chain is exemplified in independent claim 34 where a computer readable media causes a computer to implement a process that integrates data from a plurality of management systems using xml and a common schema to support organization processing. Before the processing begins a user specifies the data integration settings as described in FIG. 5A reference numbers 202 and 203 and line 16,

page 27; though line 9, page 30 of the specification. After the settings are established, data from each database are extracted, converted and stored in the application database for use in analysis. The extraction, conversion and storage of data from the basic financial system database in accordance with the established settings is described in FIG 5A, reference numbers 207, 208, 209 and 211 and line 17, page 30 through line 32, page 31 of the specification. The extraction, conversion and storage of data from operation management system in accordance with the established settings is described in FIG 5B, reference numbers 221, 222, 209 and 211 and line 3, page 32 through line 32, page 32 of the specification. The extraction, conversion and storage of data from a human resource management system in accordance with the established settings is described in FIG 5B, reference numbers 225, 226, 209 and 211 and line 5, page 33 through line 32, page 33 of the specification. The extraction, conversion and storage of data from external databases in accordance with the established settings is described in FIG 5C, reference numbers 241, 242, 209 and 211 and line 7, page 34 through line 33, page 34 of the specification. The extraction, conversion and storage of data from an advanced finance system in accordance with the established settings is described in FIG 5C, reference numbers 245, 246, 209 and 211 and line 7, page 35 through line 33, page 35 of the specification. The extraction, conversion and storage of data from soft asset management systems in accordance with the established settings is described in FIG 5D, reference numbers 261, 262, 209 and 211 and line 7, page 36 through line 3, page 37 of the specification. The extraction, conversion and storage of data from the internet in accordance with the established settings is described in FIG 5D, reference numbers 266, 267, 268 and 269 and line 19, page 37 through line 31, page 38 of the specification. Text data and geospatial measures are extracted and stored in the integrated database as described in FIG 5D, reference numbers 268, 269 and 271, FIG. 5E, reference numbers 277, 278, 279, 280, 281 and 282 and line 32, page 38 through line 33, page 41 of the specification. The stored data are then processed to identify and locate missing data, as described in FIG. 5F reference number 291 and 292 and line 1, page 42 through line 17, page 42 of the specification.

Dependent claims

The limitations and activities associated with dependent claim 35 are found a number of places including Table 16, page 29 of the specification.

The limitations and activities associated with dependent claim 36 are found in a number of places including lines 2 – 5, page 2, line 19 – 23 and Table 16 page 29 of the specification.

The limitations and activities associated with dependent claim 37 are found in a number of places including line 8, page 29 of the specification.

The limitations and activities associated with dependent claim 38 are found in a number of places including line 8, page 29 of the specification.

The limitations and activities associated with dependent claim 39 are found in a number of places including line 1, page 29 through line 6, page 30 of the specification, the development and use of a common data dictionary to support data extraction, conversion and storage are also described in line 40, column 35 through line 15, column 38 of cross referenced U.S. Patent 5,615,109.

The limitations and activities associated with dependent claim 40 are found in a number of places including line 1, page 29 through line 6, page 30 of the specification.

The limitations and activities associated with dependent claim 41 are found in a number of places including FIG. 1 reference numbers 5, 10, 15, 30 and 35 FIG 5A, reference numbers 207, 208, 209 and 211; FIG 5B, reference numbers 221, 222, 225, 226, 209 and 211 FIG 5C, reference numbers 245, 246, 209 and 211; FIG 5D, reference numbers 261, 262, 209 and 211 and line 17, page 30 through line 3, page 37 of the specification.

The limitations and activities associated with dependent claim 42 are found in a number of places including FIG. 1 reference numbers 25 and 40, FIG 5C, reference numbers 241, 242, 209 and 211, FIG 5D, reference numbers 266, 267, 268 and 269 line 7, page 34 through line 33, page 34 and line 19, page 37 through line 31, page 38 of the specification.

The limitations and activities associated with dependent claim 43 are found in a number of places including FIG. 5A reference number 207 and 208 and line 20 – 23 on page 30 of the specification.

Independent claim 44 – A second embodiment of an automated method of and system for identifying measuring and enhancing categories of value for a value chain is exemplified in independent claim 44 where a method integrates data from a plurality of management systems using xml and a common schema in order to support organization processing. Before the method begins a user specifies the data integration settings as described in FIG. 5A reference numbers 202 and 203 and line 16, page 27; though line 9, page 30 of the specification. After the settings are established, data from each database are extracted, converted and stored in the application database for use in analysis. The extraction, conversion and storage of data

from the basic financial system database in accordance with the established settings is described in FIG 5A, reference numbers 207, 208, 209 and 211 and line 17, page 30 through line 32, page 31 of the specification. The extraction, conversion and storage of data from operation management system in accordance with the established settings is described in FIG 5B, reference numbers 221, 222, 209 and 211 and line 3, page 32 through line 32, page 32 of the specification. The extraction, conversion and storage of data from a human resource management system in accordance with the established settings is described in FIG 5B, reference numbers 225, 226, 209 and 211 and line 5, page 33 through line 32, page 33 of the specification. The extraction, conversion and storage of data from external databases in accordance with the established settings is described in FIG 5C, reference numbers 241, 242, 209 and 211 and line 7, page 34 through line 33, page 34 of the specification. The extraction, conversion and storage of data from an advanced finance system in accordance with the established settings is described in FIG 5C, reference numbers 245, 246, 209 and 211 and line 7, page 35 through line 33, page 35 of the specification. The extraction, conversion and storage of data from soft asset management systems in accordance with the established settings is described in FIG 5D, reference numbers 261, 262, 209 and 211 and line 7, page 36 through line 3, page 37 of the specification. The extraction, conversion and storage of data from the internet in accordance with the established settings is described in FIG 5D, reference numbers 266, 267, 268 and 269 and line 19, page 37 through line 31, page 38 of the specification. Text data and geospatial measures are extracted and stored in the integrated database as described in FIG 5D, reference numbers 268, 269 and 271, FIG. 5E, reference numbers 277, 278, 279, 280, 281 and 282 and line 32, page 38 through line 33, page 41 of the specification. The stored data are then processed to identify and locate missing data, as described in FIG. 5F reference number 291 and 292 and line 1, page 42 through line 17, page 42 of the specification.

Dependent claims

The limitations and activities associated with dependent claim 45 are found a number of places including line 8 and Table 16 on page 29 of the specification.

The limitations and activities associated with dependent claim 46 are found in a number of places including lines 2 – 5, page 2, line 19 – 23 and Table 16 on page 29 of the specification.

The limitations and activities associated with dependent claim 47 are found in a number of places including line 1, page 29 through line 6, page 30 of the specification, the development and use of a common data dictionary to support data extraction, conversion and storage are

also described in line 40, column 35 through line 15, column 38 of cross referenced U.S. Patent 5,615,109.

The limitations and activities associated with dependent claim 48 are found in a number of places including line 1, page 29 through line 6, page 30 of the specification.

The limitations and activities associated with dependent claim 49 are found in a number of places including FIG. 1 reference numbers 5, 10, 15, 30 and 35 FIG 5A, reference numbers 207, 208, 209 and 211; FIG 5B, reference numbers 221, 222, 225, 226, 209 and 211 FIG 5C, reference numbers 245, 246, 209 and 211; FIG 5D, reference numbers 261, 262, 209 and 211 and line 17, page 30 through line 3, page 37 of the specification.

The limitations and activities associated with dependent claim 50 are found in a number of places including FIG. 1 reference numbers 25 and 40, FIG 5C, reference numbers 241, 242, 209 and 211, FIG 5D, reference numbers 266, 267, 268 and 269 line 7, page 34 through line 33, page 34 and line 19, page 37 through line 31, page 38 of the specification.

The limitations and activities associated with dependent claim 51 are found in a number of places including FIG. 5A reference number 207 and 208 and line 20 – 23 on page 30 of the specification.

The limitations and activities associated with dependent claim 52 were already described for claim 34 – this claim should have been cancelled.

Independent claim 62 – A third embodiment of an automated method of and system for identifying measuring and enhancing categories of value for a value chain is exemplified in independent claim 62 where a computer readable media causes a computer to integrate data from a plurality of management systems for use in analysis in accordance with a common schema and analyze the data in order to create a plurality of tools for organization management. More specifically, data from the database management systems associated with a plurality of enterprise transaction systems are prepared for use in processing by integrating, converting and storing the data in accordance with a common schema as described in FIG. 1, reference number 200, FIG. 5A reference numbers 201 – 204, 207 – 209 and 211 FIG. 5B reference numbers 221 – 222, 225 – 226, 209 and 211, FIG. 5C reference numbers 241 – 242, 245 – 246, 209 and 211, FIG. 5D reference numbers 261 – 262, 265, 267, 269, 209 and 211, FIG. 5E reference numbers 277 – 282, FIG. 5F reference numbers 292 – 297,and line 1, page 14 through line 35, page 43 of the specification. The integrated data are then analyzed using a

plurality of bots in order to validate the schema and develop a market value model for a value chain that uses analytical models, including network models, to identify a tangible impact of each element of value on each category of value and each component of value in accordance with the procedure detailed in FIG. 1, reference numbers 300 and 400, FIG. 6A reference number 302 – 310, FIG. 6B reference numbers 321, 323 and 326 – 329, FIG. 6C reference numbers 341 – 343 and 345 – 350 FIG. 7 reference numbers 404, 404 and 409 – 415 and line 1, page 44 through line 18, page 65 of the specification. The value chain model is then used to develop management reports as described in FIG. 8 reference numbers 504 – 507 and line 20, page 65 through line 18, page 69 of the specification. The previously calculated information is then used to support the automated trading of organization equity as described in FIG. 8 reference numbers 509 – 512 and line 20 page 69 and line 18, page 70 of the specification. The value chain model is then used for simulation and optimization using the method described in FIG. 9 reference number 603 – 605 and 610 and lines 20, page 71 through line 17, page 73 of the specification. The results of the analyses include lists of changes that will optimize one or more aspects of organization financial performance. The results are reported using the method described in FIG. 9 reference number 611 and 612 and lines 20, page 73 through line 30, page 73 of the specification.

Dependent claims

The limitations and activities associated with dependent claim 63 are found in a number of places including line 9 through 13, page 73 of the specification.

The limitations and activities associated with dependent claim 64 are found in a number of places including FIG. 1 reference numbers 5, 10, 15, 30 and 35 FIG 5A, reference numbers 207, 208, 209 and 211; FIG 5B, reference numbers 221, 222, 225, 226, 209 and 211 FIG 5C, reference numbers 245, 246, 209 and 211; FIG 5D, reference numbers 261, 262, 209 and 211 and line 17, page 30 through line 3, page 37 of the specification.

The limitations and activities associated with dependent claim 68 are found in a number of places including line 1, page 29 through line 6, page 30 of the specification, the development and use of a common data dictionary to support data extraction, conversion and storage are also described in line 40, column 35 through line 15, column 38 of cross referenced U.S. Patent 5,615,109.

The limitations and activities associated with dependent claim 69 are found in a number of places including line 1, page 29 through line 6, page 30 of the specification.

The limitations and activities associated with dependent claim 70 are found in a number of places including line 8, page 29 of the specification.

The limitations and activities associated with dependent claim 90 are found in a number of places including table 3, page 10.

The limitations and activities associated with dependent claim 91 are found in a number of places including table 3, page 10.

The limitations and activities associated with dependent claim 134 are found in a number of places including FIG. 6A, 6B and 6C and pages 50 – 78 of the specification.

6. Grounds of rejection to be reviewed on appeal

Issue 1 – Whether claim 34, claim 35, claim 36, claim 37, claim 38, claim 39, claim 40, claim 41, claim 42, claim 43, claim 44, claim 45, claim 46, claim 47, claim 48, claim 49, claim 50, claim 51 and/or claim 52 are patentable under 35 USC 103 over U.S. Patent 6,332,163 (hereinafter, Bowman-Amuah) in view of U.S. Patent 6,301,584 (hereinafter, Ranger)?

Issue 2 – Whether claim 62, claim 63, claim 64, claim 68, claim 69, claim 70, claim 90, claim 91 and/or claim 134 are patentable under 35 USC 103 over Bowman-Amuah in view of Ranger?

7. The Argument

For each ground of rejection which Appellant contests herein which applies to more than one claim, such additional claims, to the extent separately identified and argued below, do not stand and fall together.

Issue 1 – Whether claim 34, claim 35, claim 36, claim 37, claim 38, claim 39, claim 40, claim 41, claim 42, claim 43, claim 44, claim 45, claim 46, claim 47, claim 48, claim 49, claim 50, claim 51 and/or claim 52 are patentable under 35 USC 103 over U.S. Patent 6,332,163 (hereinafter, Bowman-Amuah) in view of U.S. Patent 6,301,584 (hereinafter, Ranger)?

The claims are patentable because the claims describe an invention that produces results that are concrete, tangible and useful. Other reasons the claims are patentable include the fact that cited combination of documents used to support the rejection of claim 34, claim 35, claim 36, claim 37, claim 38, claim 39, claim 40, claim 41, claim 42, claim 43, claim 44, claim 45, claim 46, claim 47, claim 48, claim 49, claim 50, claim 51 and/or claim 52 fails to establish a prima facie case of obviousness. Specific reasons the cited combination fails to establish a prima facie case of obviousness include:

1. the cited combination of document teachings requires a change in the principles governing the operation of the Bowman-Amuah and Ranger inventions;
2. the cited combination of documents fails to teach one or more limitation for every claim;
3. the cited combination of document teachings would destroy the ability of the Bowman-Amuah invention to complete its primary function of providing near-real-time predictions regarding web site visitors;
4. the cited combination of documents fails to make the invention as a whole obvious by teaching away from the claimed methods; and
5. the cited combination of documents teach away from their own combination.

The Appellant notes that there is still other ways in which the cited combination fails to produce a prima facie case of obviousness.

Reason #1 – The first reason that claim 34, claim 35, claim 36, claim 37, claim 38, claim 39, claim 40, claim 41, claim 42, claim 43, claim 44, claim 45, claim 46, claim 47, claim 48, claim 49, claim 50, claim 51 and/or claim 52 are patentable is that the proposed combination of documents would change one or more of the principles of operation of the Bowman-Amuah and Ranger methods. *MPEP 2143.01 provides that when "the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious. In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)".* As noted previously, the obviousness rejections are based on a combination of Bowman-Amuah and Ranger. Some of the changes in the operating principles of the cited documents that would be required to make the combination function are discussed below.

1. Change from combined data access and analysis to stand alone data access**.** One of the specific goals of the Bowman-Amuah invention is to couple the access to data with the completion of business functions (see page 33, Evidence Appendix, Bowman-Amuah C284, L 9 – 11). The Examiner has proposed using Bowman-Amuah in combination with Ranger to among other things render obvious an invention for the stand alone integration of data in accordance with a common schema. Modifying Bowman-Amuah to separate data access from the completion of business functions would require a change in principle in the operation of the Bowman-Amuah invention. As a result, the teachings of the cited combination of documents are not sufficient to render the claims prima facie obvious.

2. Change from integration based on rules to integration based on a common schema**.** Ranger teaches the integration of data using data reliability and rules on a one at a time basis as required to support a query (see pages 24 and 26, Evidence Appendix, Ranger C2, L20 – 40, C19, L32 – C20, L43). The Examiner has proposed using Ranger in combination with Bowman Amuah to among other things render obvious an invention for integrating data in accordance with a common schema. Modifying Ranger to integrate data in accordance with a common schema instead of rules and reliability would require a change in principle in

the operation of the Ranger invention. As a result, the teachings of the cited combination of documents are not sufficient to render the claims prima facie obvious.

3. Change from reliance on reliance on replication and synchronization services to a reliance on stand-alone data integration. Bowman-Amuah teaches a system that incorporates replication and synchronization services (see page 32, Evidence Appendix, Bowman-Amuah C49, L45 – C50, L55). A replicated database often consolidates data from heterogeneous data sources, thus shielding the user from the processes required to locate, access and query the data (see page 32, Evidence Appendix, Bowman-Amuah C50, L45 – 50). The Examiner has proposed using Bowman-Amuah in combination with Ranger to among other things render obvious an invention for the stand alone integration of data in accordance with a common schema. There would be no need for the replication and synchronization services of Bowman-Amuah if stand-alone data integration. Modifying Bowman-Amuah to eliminate replication and synchronization services would require a change in principle in the operation of the Bowman-Amuah invention. As a result, the teachings of the cited combination of documents are not sufficient to render the claims prima facie obvious.

Reason #2 – The second reason that the cited combination of documents fails to establish a prima facie case of obviousness that would support the rejection of claim 34, claim 35, claim 36, claim 37, claim 38, claim 39, claim 40, claim 41, claim 42, claim 43, claim 44, claim 45, claim 46, claim 47, claim 48, claim 49, claim 50, claim 51 and/or claim 52 is that the cited combination of documents does not teach or suggest one or more of the limitations for every rejected claim. *MPEP 2142 provides that: in order to establish a prima facie case of obviousness…the prior art reference (or references when combined) must teach or suggest all the claim limitations.* Limitations not taught or suggested include:

8) Claims 34 and 44 (affects 35 – 43 and 45 – 52). Limitations not taught or suggested include:

integrating data from a variety of systems using xml and a common schema to support organization processing

Neither Ranger or Bowman-Amuah teach integrating data from a variety of systems using xml and a common schema to support organization processing;

2) Claims 35 and 45. Limitations and activities not taught include:

where the common schema includes an organization designation

Neither Ranger or Bowman-Amuah teach where the common schema includes an organization designation;

3) Claims 36 and 46. Limitations and activities not taught include:

wherein the designated organization is a single product, a group of products, a division, a company, a multi-company corporation or a value chain

Neither Ranger or Bowman-Amuah teach where the designated organization is a single product, a group of products, a division, a company, a multi-company corporation or a value chain;

4) Claims 39 and 47. Limitations and activities not taught include:

where the common schema includes a data dictionary

Neither Ranger or Bowman-Amuah teach where a common schema includes a data dictionary;

5) Claims 40 and 48. Limitations and activities not taught include:

where the data dictionary defines standard data attributes from the group consisting of account numbers, components of value, currencies, elements of value, units of measure and time periods

Neither Ranger or Bowman-Amuah teach where the data dictionary defines standard data attributes from the group consisting of account numbers, components of value, currencies, elements of value, units of measure and time periods;

6) Claims 41 and 49. Limitations and activities not taught include:

where data are obtained from the group consisting of advanced financial systems, basic financial systems, alliance management systems, brand management systems, customer relationship management systems, channel management systems, intellectual property management systems, process management systems, vendor management systems, operation management systems, sales management systems, human resource systems, accounts receivable systems, accounts payable systems, capital asset systems, inventory systems, invoicing systems, payroll systems, purchasing systems and combinations thereof.

Neither Ranger or Bowman-Amuah teach where data are obtained from the group consisting of advanced financial systems, basic financial systems, alliance management systems, brand management systems, customer relationship management systems, channel management systems, intellectual property management systems, process management systems, vendor management systems, operation management systems, sales management systems, human resource systems, accounts receivable systems, accounts payable systems, capital asset systems, inventory systems, invoicing systems, payroll systems, purchasing systems and combinations thereof;

7) Claims 43 and 51. Limitations and activities not taught include:

where the data preparation method further comprises converting data to match a common schema and storing the converted data in a central database.

Neither Ranger or Bowman-Amuah teach converting data to match a common schema and storing the converted data in a central database.

Reason #3 – The third reason the cited combination of documents fails to establish a prima facie case of obviousness that would support the rejection of claim 34, claim 35, claim 36, claim 37, claim 38, claim 39, claim 40, claim 41, claim 42, claim 43, claim 44, claim 45, claim 46, claim 47, claim 48, claim 49, claim 50, claim 51 and/or claim 52 is that the proposed combination of Bowman-Amuah and Ranger would destroy the ability of the invention described by Bowman-Amuah to complete its primary function – serve as a fixed format stream-based communication system that provides for the real time transmission of data (see pages 27 – 29, Evidence Appendix, Bowman-Amuah abstract, FIG. 20 and C3, L 6 -7). It is well established that *when a*

modification of a reference destroys the intent, purpose or function of an invention such a proposed modification is not proper and the prima facie case of obviousness cannot be properly made (In re Gordon 733 F.2d 900, 221 U.S.PQ 1125 Fed Circuit 1984). As described previously under reason #1, the combination of document teachings proposed by the Examiner would change two of the principles of operation of the Bowman-Amuah invention by changing from a reliance on combined data access and analysis that utilizes replication and synchronization services to reliance on a separate stand alone data access. However, the increased processing time required to complete a separate data access function that includes searching for data normally provided by the replication services would destroy the ability of Bowman-Amuah invention to complete its primary function at the required speeds.

Because the proposed modification of the Bowman-Amuah invention would destroy the intent, purpose and function of the Bowman-Amuah invention, the proposed modification is improper and the prima facie case of obviousness cannot be made.

Reason #4 – The fourth reason claims claim 34, claim 35, claim 36, claim 37, claim 38, claim 39, claim 40, claim 41, claim 42, claim 43, claim 44, claim 45, claim 46, claim 47, claim 48, claim 49, claim 50, claim 51 and/or claim 52 are patentable is that the cited combination of documents fails to make the invention as a whole obvious as required by *MPEP § 2141.02 which states that: "in determining the difference between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious but whether the claimed invention as a whole would have been obvious."* Furthermore, it is well established that: *A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984).* The ways in which the cited documents (Bowman-Amuah and Ranger) lead away from the claimed invention include:

8) Claims 34 and 44 (affects 35 – 43 and 45 – 52), the cited documents teach away from:
integrating data from a variety of systems using xml and a common schema to support organization processing

Bowman-Amuah teaches away from the use of xml data integration to support organization processing as it teaches: that xml is only for tagging and displaying data on web pages and that xml is going to be displaced by SMIL (see page 31, Evidence Appendix, C 41, L 1 – 5 and C42, L5). Bowman-Amuah also teaches away by teaching that integration is just one of many application styles (see FIG. 4). Ranger teaches away by teaching that xml is useful only for formatting data for presentation (C10, L11 – 21) and by teaching integration based on rules and reliability instead of integration based on a common schema (see page 26, Evidence Appendix, Ranger C19, L32 – C20, L43);

2) Claims 35 and 45, the cited documents teach away from:
where the common schema includes an organization designation

Both Ranger and Bowman-Amuah teach away by teaching that xml is useful only for presenting data on the web;

3) Claims 36 and 46, the cited documents teach away from:

wherein the designated organization is a single product, a group of products, a division, a company, a multi-company corporation or a value chain

Both Ranger and Bowman-Amuah teach away by teaching that xml is useful only for presenting data on the web;

4) Claims 39 and 47, the cited documents teach away from:

where the common schema includes a data dictionary

Bowman-Amuah teaches away by teaching a data dictionary that is not part of a schema;

5) Claims 43 and 51. Limitations and activities not taught include:

where the data preparation method further comprises converting data to match a common schema and storing the converted data in a central database.

Bowman-Amuah teaches away by providing replication services that require multiple copies of databases (see page 32, Evidence Appendix, C49, L56);

Taken together the cited combination of documents fails to make the invention as a whole obvious. The cited combination also fails to make a single aspect of the claimed invention obvious. These failures provide additional evidence that the claimed invention for producing, concrete, tangible and useful results is new, novel and non-obvious.

Reason #5 – The fifth reason that claims claim 34, claim 35, claim 36, claim 37, claim 38, claim 39, claim 40, claim 41, claim 42, claim 43, claim 44, claim 45, claim 46, claim 47, claim 48, claim 49, claim 50, claim 51 and/or claim 52 are patentable is that the cited combination of documents fails to establish a prima facie case of obviousness because they teach away from their own combination. *MPEP § 2145 X.D.2 provides that: "it is improper to combine references where the references teach away from their combination."* The documents teach away from the proposed theoretical combination in a number of ways, including:

Teaching Incompatible data management. Ranger teaches a method for retrieving data in a response to a query that gathers information dynamically from one or more data sources which may be located at different servers and have incompatible formats (see page 23, Evidence Appendix, Ranger, abstract). Bowman-Amuah teaches a system that incorporates replication and synchronization services (see page 32, Evidence Appendix, Bowman-Amuah C49, L45 – C50, L55). A replicated database often consolidates data from heterogeneous data sources, thus shielding the user from the processes required to locate, access and query the data (see page 32, Evidence Appendix, Bowman-Amuah C50, L45 – 50). It clearly would be improper to combine an invention that teaches and relies on obtaining data using a time consuming procedure in response to a query with an invention that teaches and relies on replication and synchronization to eliminate the need for a time consuming procedure for obtaining data in response to a query.

Reason #6 The sixth reason claim 34, claim 35, claim 36, claim 37, claim 38, claim 39, claim 40, claim 41, claim 42, claim 43, claim 44, claim 45, claim 46, claim 47, claim 48, claim 49, claim 50, claim 51 and/or claim 52 are patentable is that the prior art review for the instant application is apparently being completed under a different standard than that used for the review of similar patent applications – an apparent violation of 35 USC 3. As shown in the table below, the data integration invention in 09/940,450 has broad similarities to an invention disclosed by Warshavsky (see page 34, Evidence Appendix, Warshavsky abstract).

09/421,553 – 09/940,450 specification	Warshavsky Claim #1
The software in block 203 prompts the user (20) via the metadata and conversion rules window (702) to map metadata using the standard specified by the user (20) (XML is one of the listed standards)	Creating an XML Mapping Definition from metadata using a metadata wizard
Map …from the basic financial system database (5), the operation management system database (10), the human resource information system database (15), the external database (25), the advanced financial system database (30) and the soft asset management system database (35) to the organizational hierarchy and to the pre-specified fields in the metadata mapping table (141)	Selecting relational data from a relational application database; and
The software in block 203 prompts the user (20) via the metadata and conversion rules window (702) to provide conversion rules for each metadata field for each data source. Data bots then extract, convert and store data in accordance with mapping/conversion settings.	Converting the relational data to the XML document using the XML Mapping Definition

Note: In addition to having several similarities, there are several differences between the systems. For one thing the Asset Reliance application stores data in tables in a central database while the Siebel invention creates documents. The Warshavsky metadata wizard apparently creates duplicate tags so the invention also adds a numerical suffix to duplicate metadata tags. The 09/421,553 and/or 09/940,450 system does not create duplicate metadata tags a so it does not require their removal (storing data in tables also minimizes any concern about duplicate tags). Another difference is that the 09/421,553 and/or 09/940,450 system extracts all the data from each database not just the data that matches a particular DTD.

Issue 2 – Whether claim 62, claim 63, claim 64, claim 68, claim 69, claim 70, claim 90, claim 91 and/or claim 134 are patentable under 35 USC 103 over Bowman-Amuah in view of Ranger?

The claims are patentable in view of the shortcomings in the arguments used to support the rejection of the claims and the usefulness of the results produced by the claimed invention. In particular, claim 62, claim 63, claim 64, claim 68, claim 69, claim 70, claim 90, claim 91 and/or claim 134 are allowable for the first, third, fifth and sixth reasons advanced under Issue 1.

Reason #5 – The fifth reason claim 62, claim 63, claim 64, claim 68, claim 69, claim 70, claim 90, claim 91 and/or claim 134 are patentable is that the cited combination fails to meet one of the key criteria required for establishing a prima facie case of obviousness. *MPEP 2142 provides that: in order to establish a prima facie case of obviousness…the prior art reference (or*

references when combined) must teach or suggest all the claim limitations. Limitations not taught or suggested include:

8) Claim 62 (affects 63, 64, 68, 69, 70, 90, 91 and 134). Limitations not taught or suggested include:

using at least a portion of said data to create one or more tools for organization management, and

making the one or more tools available for review

where the one or more tools for organization management further comprise a system for automated trading of organization equity and tools selected from the group consisting of analytical models, category of value models, component of value models, market value models, network models, optimization models, simulation models, value chain models, management reports, lists of changes that will optimize one or more aspects of organization financial performance and combinations thereof.

Neither Ranger or Bowman-Amuah teach a system for automated trading of organization equity, category of value models, component of value models, market value models, network models, optimization models, simulation models, value chain models, management reports, lists of changes that will optimize one or more aspects of organization financial performance and combinations thereof;

2) Claim 64 for the same reasons described previously for claims 41 and 49;

3) Claim 68 for the same reasons described previously for claims 35, 39, 45 and 47;

4) Claim 69. Limitations and activities not taught include:

where the data dictionary defines standard data attributes from the group consisting of account numbers, components of value, currencies, elements of value, organization designations, time periods and units of measure

Neither Ranger or Bowman-Amuah teach where the data dictionary defines standard data attributes from the group consisting of account numbers, components of value, currencies, elements of value, organization designations, time periods and units of measure;

5) Claim 90. Limitations and activities not taught include:

wherein the one or more aspects of organization financial performance are selected from the group consisting of organization revenue, organization expense, organization capital change, organization current operation value, organization real option value, organization market sentiment value, organization market value and combinations thereof

Neither Ranger or Bowman-Amuah teach where one or more aspects of organization financial performance are selected from the group consisting of organization revenue, organization expense, organization capital change, organization current operation value, organization real option value, organization market sentiment value, organization market value and combinations thereof;

6) Claim 91. Limitations and activities not taught include:

wherein the identified changes are changes to alliance value drivers, brand value drivers, channel value drivers, customer value drivers, customer relationship value drivers, employee value drivers, equipment value drivers, intellectual property value

drivers, partnership value drivers, process value drivers, production equipment value drivers, vendor value drivers, vendor relationship value drivers, organization equity

Neither Ranger or Bowman-Amuah teach where the identified changes are changes to alliance value drivers, brand value drivers, channel value drivers, customer value drivers, customer relationship value drivers, employee value drivers, equipment value drivers, intellectual property value drivers, partnership value drivers, process value drivers, production equipment value drivers, vendor value drivers, vendor relationship value drivers, organization equity;

7) Claim 134. Limitations and activities not taught include:

learns the relative importance of the different elements of value, categories of value and enterprises in determining organization financial performance as required to support the development of one or more tools for organization management

Neither Ranger or Bowman-Amuah teach anything about learning from the data.

8. Conclusion

As detailed above, the evidence used to support the art rejections of the pending claims consists of an improper combination of documents. For this reason and the extensive reasons listed below, the Appellant respectfully but forcefully contends that each claim is patentable.

The Appellant notes that with respect to the prosecution of the instant application, it appears that the U.S.P.T.O. has not fully complied with the requirements set forth in the APA, 35 USC 3 and 35 USC 131. Among other things, the Appellant specifically notes that:

a) At least some of the claims appear to be misclassified under class 705;

b) There appears to have been repeated violations of MPEP 904.03;

c) The Examiner has to date refused to enter references from a number of information disclosure statements submitted in accordance with the requirements of 37 CFR 1.97 and 1.98;

d) The prosecution of the instant application has experienced extraordinary delays (see page 35, Evidence Appendix), and

e) The prior art review for the instant application appears to have been completed under a different standard than that used for the review and allowance of other, similar applications.

Therefore, reversal of all rejections is courteously solicited.

Respectfully submitted,
Asset Trust, Inc.

/B.J. Bennett/

B.J. Bennett, President,
Dated: July 28, 2008

9. Claims Appendix

34. A computer readable medium having sequences of instructions stored therein, which when executed causes a processor in a computer to perform a data preparation method, comprising :integrating data from a variety of systems using xml and a common schema to support organization processing.

35. The computer readable medium of claim 34 where the common schema includes an organization designation.

36. The computer readable medium of claim 35 wherein the designated organization is a single product, a group of products, a division, a company, a multi-company corporation or a value chain.

37. The computer readable medium of claim 34 where the common schema includes a data structure.

38. The computer readable medium of claim 37 where the data structure is a hierarchy.

39. The computer readable medium of claim 34 where the common schema includes a data dictionary.

40. The computer readable medium of claim 39 where the data dictionary defines standard data attributes from the group consisting of account numbers, components of value, currencies, elements of value, units of measure and time periods.

41. The computer readable medium of claim 34 where data are obtained from the group consisting of advanced financial systems, basic financial systems, alliance management systems, brand management systems, customer relationship management systems, channel management systems, intellectual property management systems, process management systems, vendor management systems, operation management systems, sales management systems, human resource systems, accounts receivable systems, accounts payable systems, capital asset systems, inventory systems, invoicing systems, payroll systems, purchasing systems and combinations thereof.

42. The computer readable medium of claim 34 wherein at least a portion of the data are from the Internet or an external database.

43. The computer readable medium of claim 34 where the data preparation method further comprises converting data to match a common schema and storing the converted data in a central database.

44. A data preparation method, comprising:

integrating data from a variety of systems using xml and a common schema to support organization processing.

45. The method of claim 44 where the common schema includes an organization designation and data structure.

46. The method of claim 45 wherein the designated organization is a single product, a group of products, a division, a company, a multi-company corporation or a value chain.

47. The method of claim 44 where the common schema includes a data dictionary

48. The method of claim 47 where the data dictionary defines standard data attributes from the group consisting of account numbers, components of value, currencies, elements of value, units of measure and time periods.

49. The method of claim 44 where data are obtained from the group consisting of advanced financial systems, basic financial systems, alliance management systems, brand management systems, customer relationship management systems, channel management systems, intellectual property management systems, process management systems, vendor management systems, operation management systems, sales management systems, human resource systems, accounts receivable systems, accounts payable systems, capital asset systems, inventory systems, invoicing systems, payroll systems and purchasing systems.

50. The method of claim 44 wherein at least a portion of the data are from the Internet or external databases.

51. The method of claim 44 where the data preparation method further comprises converting and storing data in accordance with a common schema.

52. A computer readable medium having sequences of instructions stored therein, which when executed cause the processors in a plurality of computers connected via a network to perform the data preparation method of claim 44.

62. A computer readable medium having sequences of instructions stored therein, which when executed cause a set of processors in a plurality of computers that have been connected via a network to perform an organization management method, comprising:

integrating a plurality of organization related data from a variety of sources in accordance with a common schema,

using at least a portion of said data to create one or more tools for organization management, and

making the one or more tools available for review

where the one or more tools for organization management further comprise a system for automated trading of organization equity and tools selected from the group consisting of analytical models, category of value models, component of value models, market value models, network models, optimization models, simulation models, value chain models, management reports, lists of changes that will optimize one or more aspects of organization financial performance and combinations thereof.

63. The computer readable medium of claim 62 where the one or more tools are made available for review using an electronic display, a paper document or combinations thereof.

64. The computer readable medium of claim 62 where data are obtained from advanced financial systems, basic financial systems, alliance management systems, brand management systems, customer relationship management systems, channel management systems, estimating systems, intellectual property management systems, process management systems, supply chain management systems, vendor management systems, operation management systems, enterprise resource planning systems (ERP), material requirement planning systems (MRP), quality control systems, sales management systems, human resource systems, accounts receivable systems, accounts payable systems, capital asset systems, inventory systems, invoicing systems, payroll systems, purchasing systems, web site systems, the Internet, external databases, user input and combinations thereof.

68. The computer readable medium of claim 62, where the common schema defines common attributes selected from the group consisting of data structure, organization designation, data dictionary and combinations thereof.

69. The computer readable medium of claim 68 where the data dictionary defines standard data attributes from the group consisting of account numbers, components of value, currencies, elements of value, organization designations, time periods and units of measure.

70. The computer readable medium of claim 68 where the data structure is a hierarchy.

90. The computer readable medium of claim 62, wherein the one or more aspects of organization financial performance are selected from the group consisting of organization revenue, organization expense, organization capital change, organization current operation value, organization real option value, organization market sentiment value, organization market value and combinations thereof.

91. The computer readable medium of claim 62, wherein the identified changes are changes to alliance value drivers, brand value drivers, channel value drivers, customer value drivers, customer relationship value drivers, employee value drivers, equipment value drivers, intellectual property value drivers, partnership value drivers, process value drivers, production equipment value drivers, vendor value drivers, vendor relationship value drivers, organization equity and combinations thereof.

134. The computer readable medium of claim 62 that learns the relative importance of the different elements of value, categories of value and enterprises in determining organization financial performance as required to support the development of one or more tools for organization management.

10. Evidence Appendix

Pages 23 - 26	excerpt from Ranger document first cited May 3, 2006
Pages 27 - 33	excerpt from Bowman Amuah document first cited May 23, 2003
Page 34	excerpt from Warshavsky document first received September 16, 2004
Page 35	partial timeline of prosecution for 09/421,553 and 09/940,450

US006301584B1

(12) **United States Patent**
Ranger

(10) **Patent No.: US 6,301,584 B1**
(45) **Date of Patent: Oct. 9, 2001**

(54) **SYSTEM AND METHOD FOR RETRIEVING ENTITIES AND INTEGRATING DATA**

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(73) Assignee: **Home Information Services, Inc.**, New York, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/137,937**

(22) Filed: **Aug. 21, 1998**

Related U.S. Application Data

(63) Continuation-in-part of application No. 08/915,662, filed on Aug. 21, 1997, now Pat. No. 5,999,940.
(60) Provisional application No. 60/056,523, filed on Aug. 21, 1997.

(30) **Foreign Application Priority Data**

May 28, 1998 (EP) 98201847

(51) **Int. Cl.**[7] **G06F 17/30**
(52) **U.S. Cl.** **707/103**; 707/505; 345/329
(58) **Field of Search** 705/26; 706/54; 345/349, 329; 395/683; 707/201, 100, 103, 102, 505; 709/206

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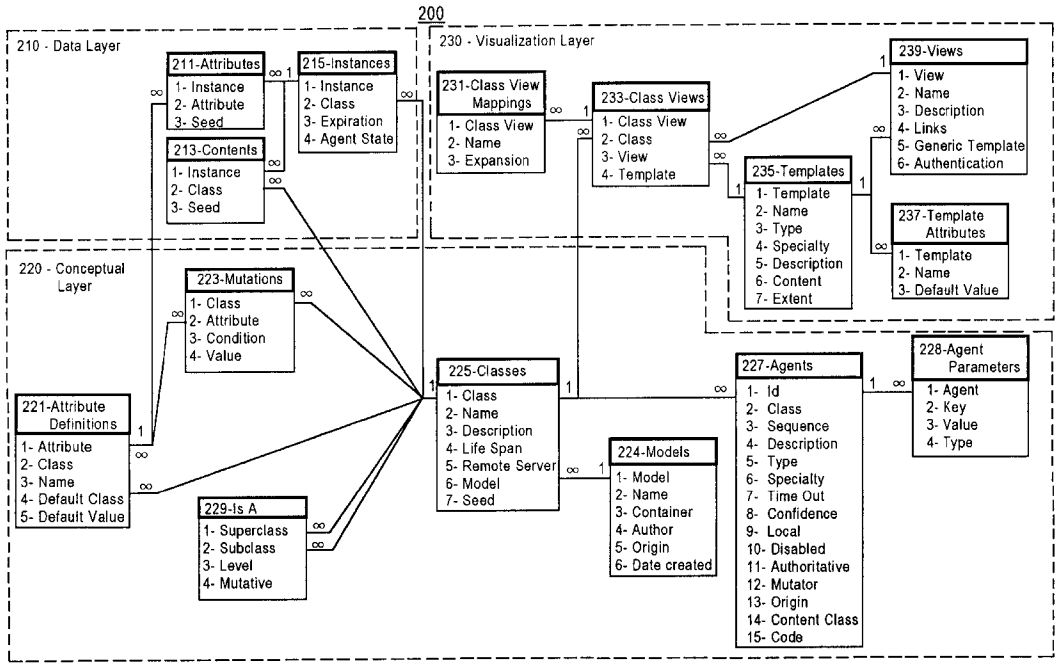
(74) *Attorney, Agent, or Firm*—McDermott, Will & Emery

(57) **ABSTRACT**

A data integration system and method gathers information dynamically from one or more data sources, which may be located at different servers and have incompatible formats, structures the information into a configurable, object-oriented information model, and outputs the information for the user according to an associated, configurable visual representation with automatic content classification.

27 Claims, 12 Drawing Sheets



SYSTEM AND METHOD FOR RETRIEVING ENTITIES AND INTEGRATING DATA

RELATED APPLICATIONS

This application is a continuation-in-part of U.S. patent application Ser. No. 08/915,662, filed Aug. 21, 1997, now U.S. Pat. No. 5,999,940 entitled "Interactive Discovery Tool and Methodology," issued on Dec. 7, 1999 by Denis Ranger, the contents of which are incorporated by reference herein, and claims the benefit of U.S. Provisional Application No. 60/056,523, entitled "Method of Data Integration," filed on Aug. 21, 1997 by Denis Ranger, the contents of which are incorporated by reference herein.

FIELD OF THE INVENTION

The present invention relates to data processing and, more particularly, to information discovery and visualization.

BACKGROUND OF THE INVENTION

There is a vast amount of information in the world today that is available by computer. For example, on the World Wide Web alone there are millions of web pages. In addition to the Internet, companies have set up local "intranets" for storing and accessing data for running their organizations. However, the sheer amount of available information is posing increasingly more difficult challenges to conventional approaches.

A major difficulty to overcome is that information relevant to a purpose of a user is often dispersed across the network at many sites. It is often time-consuming for a user to visit all these sites. One conventional approach is a search engine. A search engine is actually a set of programs accessible at a network site within a network, for example a local area network (LAN) at a company or the Internet and World Wide Web. One program, called a "robot" or "spider," pre-traverses a network in search of documents and builds large index files of keywords found in the documents.

A user of the search engine formulates a query comprising one or more keywords and submits the query to another program of the search engine. In response, the search engine inspects its own index files and displays a list of documents that match the search query, typically as hyperlinks. When a user activates one of the hyperlinks to see the information contained in the document, the user exits the site of the search engine and terminates the search process.

Search engines, however, have their drawbacks. For example, a conventional search engine suffers from obsolescence of data in its search indexes due to pre-traversing a network to index documents. Documents are constantly being updated, but it may take months for the new information to filter down to search engines. Furthermore, a search engine is oriented to discovering textual information only. In particular, conventional search engines are not well-suited to indexing information contained in structured databases, e.g. relational databases, and mixing data from incompatible data sources is difficult in conventional search engines.

Attempts have been made to present search results in an object-oriented fashion by homogenizing the search results into an "entity" that is an instance of a specified class, which may be hierarchically dependent upon another "base" class. A class specifies the attributes or properties of an entity, and a dependent class includes the attributes of the base class and additional attributes. A problem with such attempts is that the particular data returned for a particular entity is restricted

to the attributes defined for the specified class of the entity. This restriction means that if the entity to be returned actually belongs to a dependent class, hierarchically dependent upon the specified class, the number of attributes returned to the user will be limited to the properties for the base class, not the dependent class. Consequently, some search results will be not be found and presented to the user. If, however, the user wants to check if a particular entity belongs to a dependent class, another query to the system has to be submitted, specifying the particular dependent class. This checking operation becomes more time consuming as more dependent classes are specified and more entities are found.

SUMMARY OF THE INVENTION

There exists a need for a mechanism to collect relevant information located at a plurality of sites and stored in plurality of incompatible formats according to configurable search strategies.

These and other needs are met by the present invention, which dynamically gathers information from a diversity of data sources with agents, organizes the information in an configurable, information model, and visualizes the information according to a view.

Accordingly, one aspect of the invention relates to an entity retrieving system connectable to at least one data source comprising a memory and a processor connected to an interface. The memory stores a number of classes, in which each class defines the structure of an entity, including property definitions that identify property values stored in the data sources and to be retrieved dedicated to the property definition. The classes include at least one dependent class that is hierarchically linked to at least one other class and contains additional property definitions specifying additional property values, in addition to the property values of the class from which it depends.

The processor, in cooperation with the interface, is configured for receiving a query, which includes an identifier for identifying a particular class and at least one of the property values. The processor also selects, among the classes, the particular class dedicated to the identifier under control of said query, accesses the data sources, retrieves property values pertaining to at least one particular entity that comprises that property value, and outputs the retrieve entities. Upon establishing that the particular entity pertains to one of said dependent classes of the selected particular class, the processor is configured to retrieve the additional properties of the dependent class. According to another aspect, the processor is configured for invoking a plurality of agents concurrently to gather the requested information from the data sources.

Additional objects, advantages, and novel features of the present invention will be set forth in part in the description that follows, and in part, will become apparent upon examination or may be learned by practice of the invention. The objects and advantages of the invention may be realized and obtained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

FIG. **1** is a high-level block diagram of a computer system with which an embodiment of the present invention can be implemented.

payroll purposes. When an "employee" instance is resolved, the actual class of the instance is one of the two subclass, "exempt" or "nonexempt."

On the other hand, if such an instance is not cached in the data layer **210**, then the instance is instantiated in step **504** with attributes initialized from the seed parameter and the default values in the attribute description, e.g. in the **231-5** field. Instantiation results in the creation of a new entry in the "Instances" table **215** with a unique instance identifier being stored in the "Instance" field **215-1**. In addition, the "Agent Seed" field **215-5** is initialized to the seed parameter and the "Agent State" field **215-4** is cleared.

In step **506**, a "puzzle" is set up that determines which agents are to be invoked for gathering information for the new instance. These agents may be agents specified for the class identified by the class parameter ("class agents") and non-local agents of superclasses of the class ("non-local superclass agents"). In one embodiment, agents are listed in respective entries of the "Agents" table **227**. Class agents are determined from entries in which the class identifier in the "Class" field **227-2** matches the class parameter received in step **500**. Non-local superclass agents are determined from entries in which the "Local" field **227-9** is false and the class identifier in the "Class" field **227-2** matches the class identifier specified in the "Superclass" field **229-1** of the "Is A" table **229** wherein the corresponding "Subclass" field **229-2** contains the class identifier matching the input class parameter.

As described in more detail hereinafter, the puzzle is run, invoking agent to gather data and then integrating the data into one or more entities (step **508**). If successful, the one or more entities are cached in the data layer **210** (step **510**), setting the "Expiration" field **215-3**, as appropriate. For example, the "Expiration" field **215-3** may contain the termination date of a mortal object (cf. the "Life Span" field **225-4**). When a mortal object has expired, it is removed from the data layer **210**. Finally, the instance identifier and the actual class, possibly changed due to a mutation, of the instance is returned in step **512**.

Since agents are invoked when an instance is resolved, information that is potentially more up-to-date can be retrieved than through conventional search engines. Conventional search engines pre-traverse the web to build their index files, which may become out of date for months until the search index is re-updated. With the present invention, however, the "Life Span" attribute controls how long any information object is cached, reducing the obsolescence of information stored at the server to individually acceptable levels, e.g. caching for only a month.

Invoking Agents

Referring to FIG. **6**, running a puzzle results in invoking agents to dynamically access, collect, and integrate "pieces" of data from data sources. More specifically, the agents associated with the class (and superclasses) of the entity to be retrieved are examined. In step **600**, queries are built as a combination of an agent and a "pieece" of information as an input parameter, typically a previously determined attribute for the entity to be retrieved such as a seed value. For example, an agent may get additional information about a person based on a social security number. Given the social security number, a query is created in conjunction with the agent, using the social security number as an input parameter.

On systems that support multi-tasking, all the built queries are launched concurrently at step **602**. Launching a query involves invoking (or executing) an agent with the corresponding piece of information as an input value. The result of launching a query is a result code and, if appropriate, a list of pieces. The result codes are REFRESH_AND_CONTINUE, REFRESH_AND_QUIT, FAIL_AND_CONTINUE, and FAIL_AND_QUIT. "REFRESH" means that the query was successful, while "FAIL" means that the query was unsuccessful (e.g. time out or not found in the data source). "CONTINUE" means that the result is incomplete and "QUIT" means that the query result is controlling, whether successful or unsuccessful. A piece is an attribute, value pair, such as "Name='Bob Smith'".

Generally, agents come in two flavors, attribute agents and content agents, specified in the "Type" field **227-5** of the "Agents" table **227**. An attribute agent is responsible for gathering information about an instance itself, for example, getting the author of a document, the size of the document, and creation date. Attribute agents are normally invoked during instance resolution, which takes place the first time the value of an attribute is requested. In the example, the agent that discovered the length of employment for an employee from an authoritative database is an attribute agent.

Content agents are responsible for gathering the content of the object, for example, getting files in a directory, graphics from a web page, or names from a telephone book. Content agents are invoked whenever content of the object is first accessed, usually when producing a visualization for the object's space. In the example, the agent that discovered files in a directory is a content agent.

To support concurrent query execution, queries use a common "blackboard" to post their results. When a query is launched, the blackboard is first checked for an entry listing the agent and piece. If the entity is incomplete, because another query is currently running, then the query waits until the result from the running query is available and returns the result posted on the blackboard. On the other hand, if there is not entry for the agent and piece, then such an entry in the blackboard is created, the agent is invoked, and the results are posted on to the blackboard and returned.

When an agent is invoked, it is passed an instance identifier for accessing and modifying attributes of the instance being resolved and the input seed value. For example, if the instance is a member of a "employee" class and the seed value is an employee number, the agent is passed an identifier of the instance and the employee number. The agent may use the employee number to query an authoritative database (cf. the "Authoritative" field **227-11**), parse the result to determine some values of attributes (such as length of employment), and initialize the attributes with the parsed values. As another example, a "directory" object may use a pathname as a seed value. The contents, e.g. files and other directories, of a directory having that pathname may be inspected by the agent for creating file objects as contents of the directory object.

At step **604**, the results of launching the queries are processed as they come in. If the query failed to run due to a timeout condition (e.g. with a result code of FAIL_AND_CONTINUE), then the query is placed on a failed queries list. If the query has failed and the agent is considered to be authoritative (result code of FAIL_AND_QUIT), then all remaining agents are marked as done and the search for this puzzle is terminated. If the query has failed, but not due to a time-out (also FAIL_AND_CONTINUE), then the agent is simply marked as done, but the other, concurrently

invoked agents are allowed to continue. Results of a content query are added to the content of the current result. Attribute queries, on the other hand, add their results to the attributes of the current result. Failed queries are retried in step **606**.

In the example illustrated in FIG. **9**, an agent dedicated to the Product class, is provided for retrieving the Supplier and Type property values based on the ID number. These property values are for example stored in an internal data source, for example a relational database **246**. The agent comprises an address in field Origin **227-13** indicating the path name of the database **246** data source. In order to enable to retrieve data from different types of data sources, there are provided different types of agents. For a relational database such as Oracle ®, the agent is an ODBC agent type. The agent further comprises a series of instructions indicating which data from the addressed data source are to be retrieved by the agent, for example:

"SELECT Key, Type, Supplier FROM Products"

The agent further comprises in its agent parameters **228** for assigning, for each property value to be retrieved, a portion of the data to one of the property definitions. In this case, "Key" is assigned to "ID" property definition, "Type" to "Type" property definition and "Supplier" to "Supplier" property definition.

This agent co-operates with interface **111** for accessing the data source, under control of processor **104** and for retrieving the requested data. In the example mentioned hereinabove, the following data will be returned: "93-21123" forming the ID, "Doubleday" forming the Supplier and "Book" forming the type.

Data Integration

When several agents retrieve, from different data sources, property values that should correspond, some property values retrieve might not be equal to each other. For example, a customer's telephone number may be recorded differently in two data sources, or there might be three different authors for the same book title. In the first case, it is probable that the same customer has two phone numbers (an inconsistency), in the second case, we may be dealing with three altogether different books (an ambiguity).

Inconsistencies and ambiguities are virtually unavoidable when integrating multiple data sources that were not conceived together and that may not even be managed by the same organization. There is therefore a need for appropriately handling ambiguities and inconsistencies within data. The manner in which an embodiment handles these problems is explained by means of an example.

Assume that agents are looking for a Person named Bob Smith. Agent A is configured to look for a person's address given the person's name. Agents B and C are configured to look for a person' age given the person's name, each agent targeting a separate data source. This example is illustrated in FIG. **10**.

Agent A returns with not one but two "Bob Smith", one living in New York and the other in Newark. Determining whether there are two persons named Bob Smith or only one with a conflicting address depends on how much to trust Agent A to be accurate or, in other words, whether its data source contains the correct addresses. For this purpose, a reliability or confidence parameter **227-8** is assigned to the agent. If the confidence parameter for agent A is 100%, then there are two persons named Bob Smith and two entities are thus shown to the user. On the other hand, if Agent A has a confidence parameter of only 10%, then the one entity is produced, showing two possibilities for a property value, e.g. "New York OR Newark".

Assume now agent A has a 100% reliability parameter. Agent B and C for the Bob Smith in New York obtain his age. Both agree that it is 35. However agents B and C for the Bob Smith in Newark disagree about his age. Agent B indicates 24 and Agent C 27. In this case, Agents B and C are fallible, but their disagreement is not sufficient grounds to see two separate persons named Bob Smith living in Newark. If Agents B and C have substantially the same reliability parameter that is relatively low, for example 10%, then one entity will be presented to the user with an indication of two property values for the age: "24 OR 27", such as illustrated in FIG. **10**. In this situation, there is a "conflict of opinion" between data sources about the age the Bob Smith living in Newark. Because of ambiguities and inconsistencies, a request to an embodiment to find an entity may end up returning more than one entity, with some "conflicts of opinion" about some of them. When this occurs, the user is presented with a display using the generic template **239-5** for the requested view, e.g. a Web page, that gives a choice between these entities and highlights conflicts.

If Agents B and C have substantially the same reliability parameter, which is relatively high, for example 90%, then on embodiment interprets that there are two distinct entities as being two separate entities which will be presented to the user, each with its own age. If agent B is substantially more reliable than agent C, for example agent B is at least 25% more reliable than agent C, then an embodiment will prefer the property value retrieved by agent B, i.e. 24, and only the entity retrieved having this value will be presented to the user.

Consequently, providing a reliability parameter for agents, inconsistencies and ambiguities in property values can be interpreted, filtering out unreliable property values or presenting them in an appropriate fashion to the user.

When it is determined that two or more entities are to be created, for example two persons named Bob Smith, instances are created for each new entity. For each new entity, a new corresponding sub-puzzle is set up and then run. At this point, the top-level puzzle switches to a passive mode in which the top-level puzzle waits for all the sub-puzzles to finish and return their results recursively.

Mutations

Sometimes, information discovered for an entity, typically by an attribute agent, causes the entity to change its class. Accordingly, the entity is checked if a mutation should be performed to change the class of the entity (step **608**). In a particular check, mutation patterns or mutation agents dedicated to one of the dependent classes of the current entity are checked. This checking can be performed by verifying, for each dependent class, if the mutative field **229-4** is true. If true, then mutation patterns or mutation agents dedicated to the classes "Book" and "Audio Tape" are examined. A mutation pattern dedicated to the classes book comprises a condition, for example: "If the Product Type ="book" then mutate the Product into a Book", which is evaluated to determine if the found property value for the product type falls within the condition. For this purpose, the processor **102** compares the property values stored in the memory **104** with the condition of the mutation pattern. In the example, the retrieved property for the product type is a "Book". Thus, a mutation occurs and the class of the entity becomes "Book" causing additional property values pertaining to the class "Book" to be retrieved. A mutation agent is a stored procedure or other piece of procedural logic that can

US006332163B1

(12) **United States Patent**
Bowman-Amuah

(10) **Patent No.: US 6,332,163 B1**
(45) **Date of Patent: Dec. 18, 2001**

(54) **METHOD FOR PROVIDING COMMUNICATION SERVICES OVER A COMPUTER NETWORK SYSTEM**

(75) Inventor: **Michel K. Bowman-Amuah**, Colorado Springs, CO (US)

(73) Assignee: **Accenture, LLP**, Palo Alto, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(58) **Field of Search** 709/102, 202, 709/203, 217, 218, 219, 223, 225, 227, 230, 231, 238, 329

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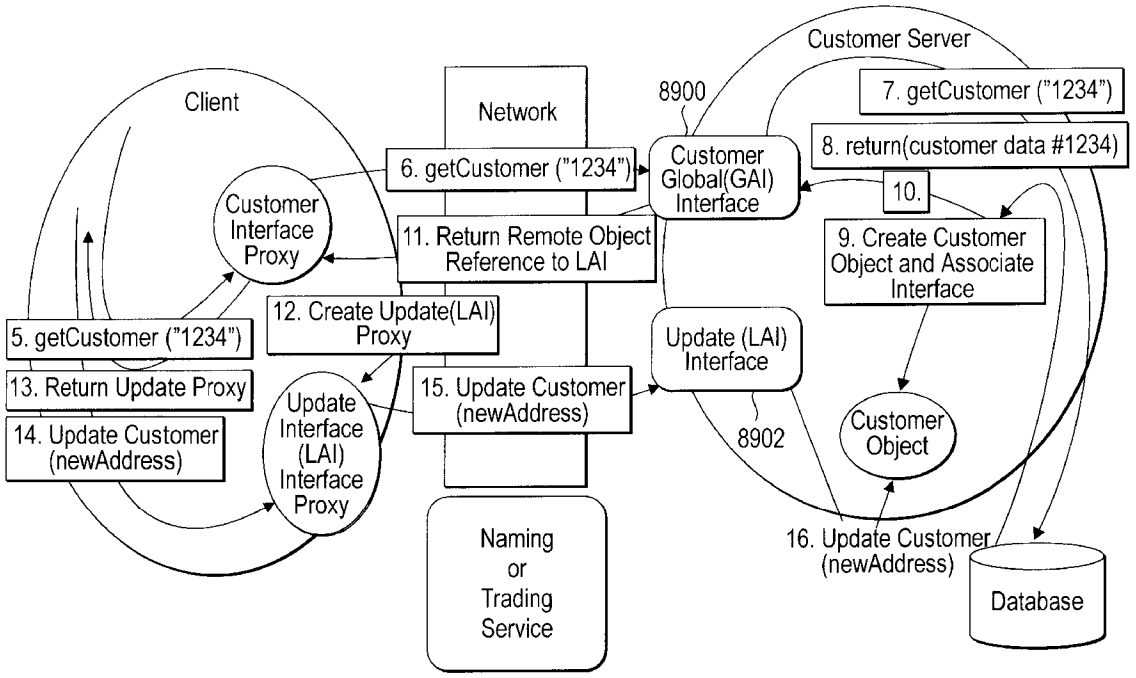
(57) **ABSTRACT**

A system, method and article of manufacture are provided for implementing communication services patterns. A fixed format stream-based communication system is provided and service is delivered via a globally addressable interface. Access is afforded to a legacy system. Service is delivered via a locally addressable interface. A null value is communicated and data is transmitted from a server to a client via pages. A naming service and a client are interfaced with the naming service allowing access to a plurality of different sets of services from a plurality of globally addressable interfaces. A stream-based communication system is provided and data is efficiently retrieved.

15 Claims, 123 Drawing Sheets



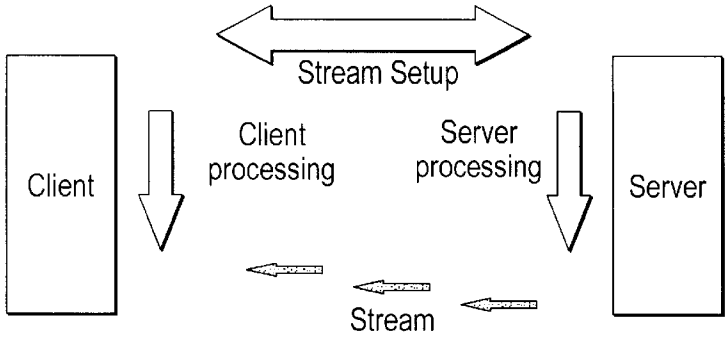


Fig. 20

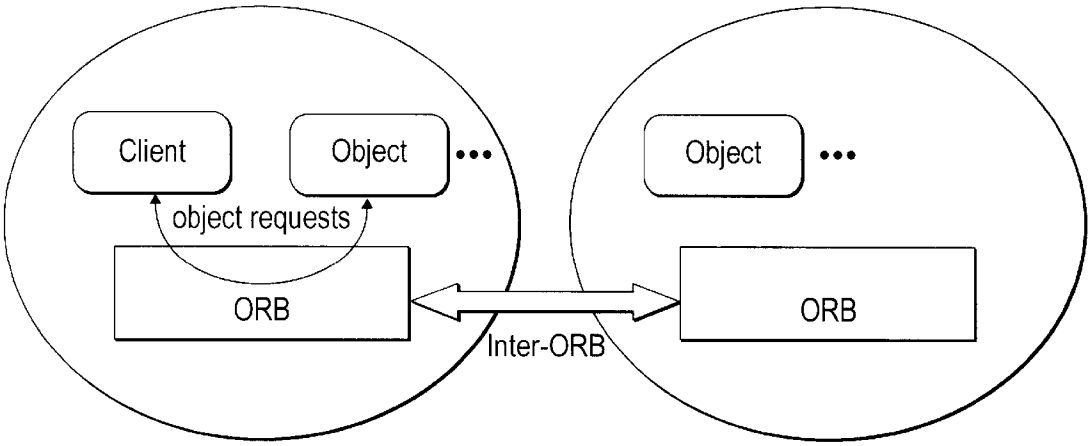


Fig. 21

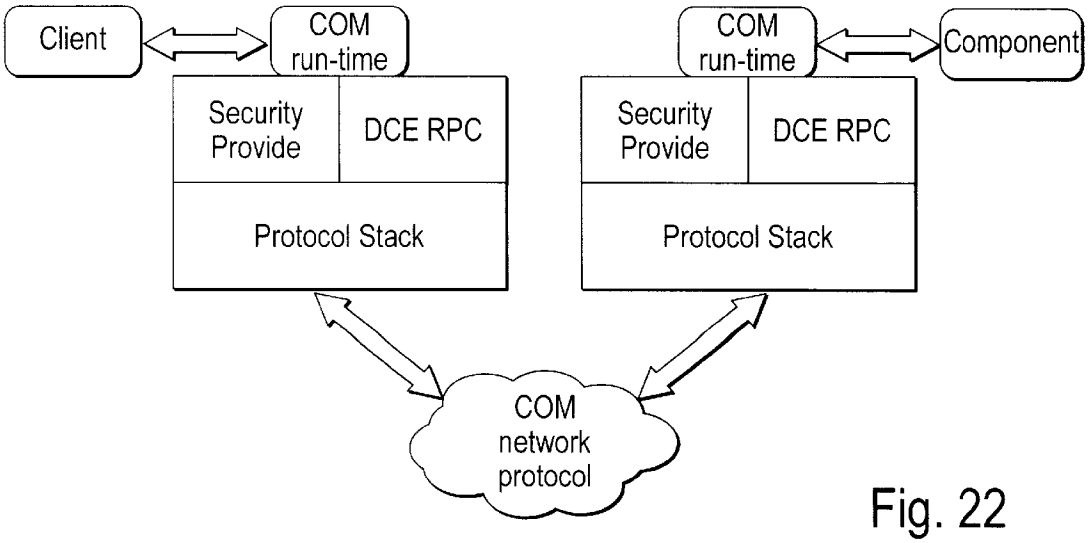


Fig. 22

FIG. **16** illustrates File Sharing services;

FIG. **17** depicts Message Passing services;

FIG. **18** depicts Message Queuing services;

FIG. **19** illustrates Publish and Subscribe services;

FIG. **20** depicts Streaming, in which a real-time data stream is transferred;

FIG. **21** illustrates CORBA-based Object Messaging;

FIG. **22** illustrates COM Messaging;

FIG. **23** represents CTI Messaging;

FIG. **24** illustrates various components of the Communication Fabric of the present invention;

FIG. **25** illustrates the two categories of the Physical Media;

FIG. **26** illustrates several of the components of the Transaction areas of the Netcentric Architecture Framework;

FIG. **27** illustrates various components of the Environmental Services of the Netcentric Architecture Framework;

FIG. **28** illustrates the Base Services of the Netcentric Architecture Framework;

FIG. **29** shows the major components of the reporting application framework;

FIG. **30** illustrates an example of how a custom report architecture relates to a workstation platform technology architecture;

FIG. **31** describes the relationships between the major components of the report process and the report writer process;

FIG. **32** shows the module hierarchy for the custom report process;

FIG. **33** depicts the various components of the Business Logic portion of the Netcentric Architecture Framework;

FIG. **34** illustrates a relationship between major themes that impact aspects of software development and management;

FIG. **35** illustrates how components are viewed from different perspectives;

FIG. **36** shows a relationship between business components and partitioned business components;

FIG. **37** shows how a Billing Business Component may create an invoice;

FIG. **38** illustrates the relationship between the spectrum of Business Components and the types of Partitioned Business Components;

FIG. **39** illustrates the flow of workflow, dialog flow, and/or user interface designs to a User Interface Component;

FIG. **40** is a diagram of an Application Model which illustrates how the different types of Partitioned Business Components might interact with each other;

FIG. **41** illustrates what makes up a Partitioned Business Component;

FIG. **42** illustrates the role of patterns and frameworks;

FIG. **43** illustrates this Business Component Identifying Methodology including both Planning and Delivering stages;

FIG. **44** shows a high level picture of application component interaction for an Order Entry system;

FIG. **45** illustrates a traditional organization structure including an activities component, a credit/collections component, a billing component, and a finance component;

FIG. **46** provides an illustration of a horizontal organization model;

FIG. **47** illustrates a workcell organization approach including an activities component, a credit/collections component, a billing component, and a finance component;

FIG. **48** illustrates the Enterprise Information Architecture (EIA) model;

FIG. **49** illustrates a V-model of Verification, Validation, and Testing;

FIG. **50** portrays of a development architecture with a seamless integration of tools which can be plugged in for the capture and communication of particular deliverables;

FIG. **51** shows a design architecture with the compromises made for today's component construction environment;

FIG. **52** illustrates a business process to object mapping;

FIG. **53** is a diagram which illustrates a graph of resilience to change;

FIG. **54** illustrates a flowchart for a method for providing an abstraction factory pattern in accordance with an embodiment of the present invention;

FIG. **55** illustrates a flowchart for a method for representing a plurality of batch jobs of a system each with a unique class in accordance with an embodiment of the present invention;

FIG. **56** illustrates a class diagram of the batch job hierarchy;

FIG. **57** illustrates an object interaction graph of a possible implementation of the class diagram of FIG. **56**;

FIG. **58** illustrates a flowchart for a method for controlling access to data of a business object via an attribute dictionary in accordance with an embodiment of the present invention;

FIG. **59** illustrates a flowchart for a method for structuring batch activities for simplified reconfiguration in accordance with an embodiment of the present invention;

FIG. **60** illustrates the manner in which the AttributeDictionaryClient is the facade which delegates to the AttributeDictionary;

FIG. **61** depicts the use of the containsKey() method on the HashMap to ensure that the value will exist before the get() method is used;

FIG. **62** illustrates a method that dictates that any nullPointerException that is thrown would be caught and rethrown as the more user-friendly exception in the attribute dictionary pattern environment;

FIG. **63** illustrates the Get the Attribute Names method in the attribute dictionary pattern environment;

FIG. **64** illustrates a flowchart for a method for managing constants in a computer program in accordance with an embodiment of the present invention;

FIG. **65** illustrates a flowchart for a method for providing a fixed format stream-based communication system in accordance with an embodiment of the present invention;

FIG. **66** illustrates two systems communicating via a stream-based communication and using a common generic format to relay the meta-data information;

FIG. **67** illustrates an example of a Fixed Format message associated with the fixed format stream patterns;

FIG. **68** depicts the complete Fixed Format Stream pattern associated with the fixed format stream patterns;

FIG. **69** illustrates fixed format contracts containing meta-data information for translating structured data onto and off of a stream;

FIG. **70** illustrates a Customer object in an object-based system streaming itself into a stream, the stream being sent

ing key data-window relationship. This allows the user to work in a controlled and, well managed, environment.

Web Browser **1308**

Web Browser Services allow users to view and interact with applications and documents made up of varying data types, such as text, graphics, and audio. These services also provide support for navigation within and across documents no matter where they are located, through the use of links embedded into the document content. Web Browser Services retain the link connection, i.e., document physical location, and mask the complexities of that connection from the user. Web Browser services can be further subdivided into: Browser Extension, Form, and User Navigation.

Parlez-vous Internet?

The Elements of Web Style

Language philosopher Benjamin Whorf once said, "We dissect nature along lines laid down by our native language. Language is not simply a reporting device for experience, but a defining framework for it." This notion is especially true when applied to the World Wide Web. The evolution of the Web from a rigid, text-centric village to an elastic, multimedia-rich universe has been driven by modifications to the languages behind it. The Internet is at a crucial point in its development as a number of enhancements for extending Web technology come under scrutiny by Internet standards groups. These enhancements will ultimately push the Web into the realms of distributed document processing and interactive multimedia.

SGML: in the beginning . . .

Although the World Wide Web was not created until the early 1990s, the language behind it dates back to the genesis of the Internet in the 1960s. Scientists at IBM were working on a Generalized Markup Language (GML) for describing, formatting, and sharing electronic documents. Markup refers to the practice in traditional publishing of annotating manuscripts with layout instructions for the typesetters.

In 1986, the International Standards Organization (ISO) adopted a version of that early GML called Standard Generalized Markup Language (SGML). SGML is a large and highly-sophisticated system for tagging documents to ensure that their appearance will remain the same regardless of the type of platform used to view them. Designers use SGML to create Document Type Definitions (DTDs), which detail how tags (also known as format codes) are defined and interpreted within specified documents. These tags can be used to control the positioning and formatting of a document's text and images. SGML is used for large, complex, and highly-structured documents that are subject to frequent revisions, such as dictionaries, indexes, computer manuals, and corporate telephone directories.

HTML: SGML for dummies?

While creating the World Wide Web in the early 1990s, scientists at CERN discovered that in spite of its power and versatility, SGML's sophistication did not allow for quick and easy Web publishing. As a result, they developed HyperText Markup Language (HTML), a relatively simple application of SGML. This simplicity has contributed to the exponential growth of the Web over the last few years. HTML files are written in plain text and can be created using any text editor from the most robust Web page authoring software (such as Microsoft's FrontPage or Sausage Software's HotDog) to the anemic Notepad utility included with Microsoft's Windows operating system.

As with many languages, HTML is in a state of constant evolution. The World Wide Web Consortium W3C oversees new extensions of HTML developed by both software companies (such as Microsoft and Netscape Communications) and individual Web page authors and ensures that each new specification is fully-compatible with previous ones. Basic features supported by HTML include headings, lists, paragraphs, tables, electronic forms, in-line images (images next to text), and hypertext links. Enhancements to the original HTML 1.0 specification include banners, the applet tag to support Java, image maps, and text flow around images.

The W3C also approved the specification for version 4.0 of HTML (http://www.w3.org/TR/REC-html40). This specification builds upon earlier iterations of HTML by enabling Web authors to include advanced forms, in-line frames, and enhanced tables in Web pages. HTML 4.0 also allows authors to publish pages in any language, and to better manage differences in language, text direction, and character encoding.

Perhaps most significantly, HTML 4.0 increases authors' control over how pages are organized by adding support for Cascading Style Sheets CSS Style sheets contain directions for how and where layout elements such as margins, fonts, headers, and links are displayed in Web pages. With CSS, authors can use programming scripts and objects to apply multiple style sheets to Web pages to create dynamic content. CSS can also be used to centralize control of layout attributes for multiple pages within a Web site, thus avoiding the tedious process of changing each page individually.

Dynamic HTML: Dyn-o-mite!

HTML's simplicity soon began to limit authors who demanded more advanced multimedia and page design capabilities. Enter Dynamic HTML DHTML As an extension of HTML, DHTML allows Web pages to function more like interactive CD-ROMs by responding to user-generated events. DHTML allows Web page objects to be manipulated after they have been loaded into a browser. This enables users to shun plug-ins and Java applets and avoid bandwidth-consuming return trips to the server. For example, tables can expand or headers can scurry across the page based on a user's mouse movements.

Unfortunately, the tremendous potential offered by DHTML is marred by incompatible standards. At the heart of the DHTML debate is a specification called the Document Object Model DOM The DOM categorizes Web page elements—including text, images, and links—as objects and specifies the attributes that are associated with each object. The DOM makes Web document objects accessible to scripting languages such as JavaScript and VisualBasic Script (VBScript), which can be used to change the appearance, location, and even the content of those objects in real-time.

Microsoft's Internet Explorer 4.0 supports a W3C "Working Draft" DOM specification that uses the CSS standard for layout control and Web document object manipulation. In contrast, Netscape's implementation of DHTML in Communicator 4.0 uses a proprietary "Dynamic Layers" tag, which assigns multiple layers to a page within which objects are manipulated. As a result, Web pages authored using either version of DHTML may not be viewed properly using the other's browser. XML: X marks the spot

HTML 4.0 and Dynamic HTML have given Web authors more control over the ways in which a Web page is displayed. But they have done little to address a growing problem in the developer community: how to access and manage data in Web documents so as to gain more control over document structure. To this end, leading Internet developers devised Extensible Markup Language (XML), a watered-down version of SGML that reduces its complexity

while maintaining its flexibility. Like SGML, XML is a meta-language that allows authors to create their own customized tags to identify different types of data on their Web pages. In addition to improving document structure, these tags will make it possible to more effectively index and search for information in databases and on the Web.

XML documents consist of two parts. The first is the document itself, which contains XML tags for identifying data elements and resembles an HTML document. The second part is a DTD that defines the document structure by explaining what the tags mean and how they should be interpreted. In order to view XML documents, Web browsers and search engines will need special XML processors called "parsers." Currently, Microsoft's Internet Explorer 4.0 contains two XML parsers: a high-performance parser written in C++ and another one written in Java.

A number of vendors plan to use XML as the underlying language for new Web standards and applications. Microsoft uses XML for its Channel Definition Format, a Web-based "push" content delivery system included in Internet Explorer 4.0. Netscape will use XML in its Meta Content Framework to describe and store metadata, or collections of information, in forthcoming versions of Communicator. XML is currently playing an important role the realm of electronic commerce via the Open Financial Exchange, an application developed by Microsoft, Intuit, and CheckFree for conducting electronic financial transactions. Similarly, HL7, a healthcare information systems standards organization, is using XML to support electronic data interchange EDI of clinical, financial, and administrative information (http://www.mcis.duke.edu/standards/HL7/sigs/sgml/index.html).

Meet cousin VRML

In 1994, a number of Internet thought leaders, including Tim Berners-Lee—the "father" of the Web—met to determine how they could bring the hot, new technology known as virtual reality VR to the Web. VR refers to the use of computers to create artificial and navigable 3-D worlds where users can create and manipulate virtual objects in real time. This led to the creation of Virtual Reality Modeling Language (VRML—pronounced "ver-mul"). VRML is technically not a markup language because it uses graphical rather than text-based file formats.

In order to create 3-D worlds and objects with VRML, users need a VRML editor such as Silicon Graphics' Cosmo Worlds (http://cosmo.sgi.com/products/studio/worlds). To view VRML content, users need either a VRML browser or a VRML plug-in for standard HTML browsers. Leading VRML plug-ins include Cosmo Player from Silicon Graphics (http://vrml.sgi.com/cosmoplayer), Liquid Reality from Microsoft's DimensionX subsidiary (http://www.microsoft.com/dimensionx), OZ Virtual from OZ Interactive (http://www.oz.com/ov/main_bot.html), and WorldView from Intervista (http://www.intervista.com/products/worldview/index.html), These plug-ins can typically be downloaded for free from the Web.

VRML is capable of displaying static and animated objects and supports hyperlinks to multimedia formats such as audio clips, video files, and graphical images. As users maneuver through VRML worlds, the landscape shifts to match their movements and give the impression that they are moving through real space. The new VRML 2.0 specification finalized in August 1996 intensifies the immersive experience of VR worlds on the Web by enabling users to interact both with each other and with their surroundings. Other new features supported by VRML 2.0 include richer geometry description, background textures, sound and video, multilingual text, Java applets, and scripting using VBScript and JavaScript. VRML will become a significant technology in creating next-generation Internet application as the language continues to mature and its availability increases.

The future: give us a big SMIL

The Web has come a long way since the codification of HTML 1.0. It has moved from simple text-based documents that included headings, bulleted lists, and hyperlinks to dynamic pages that support rich graphic images and virtual reality. So what next for the Web? The answer resides in a Synchronized Multimedia Integration Language (SMIL), a new markup language being developed by the W3C. SMIL will allow Web authors to deliver television-like content over the Web using less bandwidth and a simple text editor, rather than intricate scripting.

SMIL is based on XML and does not represent a specific media format. Instead, SMIL defines the tags that link different media types together. The language enables Web authors to sort multimedia content into separate audio, video, text, and image files and streams which are sent to a user's browser. The SMIL tags then specify the "schedule" for displaying those components by determining whether they should be played together or sequentially. This enables elaborate multimedia presentations to be created out of smaller, less bandwidth-consuming components.

Implementation Considerations

Many features such as graphics, frames, etc. supported by Web Browsers today were not available in initial releases. Furthermore, with every new release the functionality supported by Web Browsers keeps growing at a remarkable pace.

Much of the appeal of Web Browsers is the ability to provide a universal client that will offer users a consistent and familiar user interface from which many types of applications can be executed and many types of documents can be viewed, on many types of operating systems and machines, as well as independent of where these applications and documents reside.

Web Browsers employ standard protocols such as Hypertext Transfer Protocol (HTTP) and File Transfer Protocol (FTP) to provide seamless access to documents across machine and network boundaries.

The distinction between the desktop and the Web Browser narrowed with the release of Microsoft IE 4.0, which integrated Web browsing into the desktop, and gave a user the ability to view directories as though they were Web pages. Web Browser, as a distinct entity, may even fade away with time.

Exemplary products that may be used to implement this component includes Netscape Navigator; Netscape Communicator; Microsoft Internet Explorer; Netscape LiveWire; Netscape LiveWire Pro; Symantec Visual Cafe; Microsoft Front Page; Microsoft Visual J++; IBM VisualAge.

Execution Products:

- Netscape Navigator or Communicator—one of the original Web Browsers, Navigator currently has the largest market share of the installed browser market and strong developer support. Communicator is the newest version with add-on collaborative functionality
- Microsoft Internet Explorer (IE)—a Web Browser that is tightly integrated with Windows and supports the major features of the Netscape Navigator as well as Microsoft's own ActiveX technologies.

Development Products:

Web Browsers require new or at least revised development tools for working with new languages and standards such as HTML, ActiveX and Java. Many browser content

call-level SQL variants and supersets. Depending upon the underlying storage model, non-SQL access methods may be used instead.

Many of the Netcentric applications are broadcast-type applications, designed to market products and/or publish policies and procedures. Furthermore, there is now a growth of Netcentric applications that are transaction-type applications used to process a customers sales order, maintenance request, etc. Typically these type of applications require integration with a database manager. Database Services include: Storage Services, Indexing Services, Security Services, Access Services, and Replication/Synchronization Services

Implementation Considerations

The core database services such as Security, Storage and Access are provided by all major RDBMS products, whereas the additional services of Synchronization and Replication are available only in specific products.

Product Considerations

Oracle 7.3; Sybase SQL Server; Informix; IBM DB/2; Microsoft SQL Server

Oracle 7.3—market leader in the Unix client/server RDBMS market, Oracle is available for a wide variety of hardware platforms including MPP machines. Oracles market position and breadth of platform support has made it the RDBMS of choice for variety of financial, accounting, human resources, and manufacturing application software packages. Informix—second in RDBMS market share after Oracle, Informix is often selected for its ability to support both large centralized databases and distributed environments with a single RDBMS product. Sybase SQL Server—third in RDBMS market share, Sybase traditionally focused upon medium-sized databases and distributed environments; it has strong architecture support for database replication and distributed transaction processing across remote sites.

IBM DB2—the leader in MVS mainframe database management, IBM DB2 family of relational database products are designed to offer open, industrial strength database management for decision support, transaction processing and line of business applications. The DB2 family now spans not only IBM platforms like personal computers, AS/400 systems, RISC System/6000 hardware and IBM mainframe computers, but also non-IBM machines such as Hewlett-Packard and Sun Microsystems. Microsoft SQL Server—the latest version of a high-performance client/server relational database management system. Building on version 6.0, SQL Server 6.5 introduces key new features such as transparent distributed transactions, simplified administration, OLE-based programming interfaces, improved support for industry standards and Internet integration.

Replication/Synchronization **1404**

Replication Services support an environment in which multiple copies of databases must be maintained. For example, if ad hoc reporting queries or data warehousing applications can work with a replica of the transaction database, these resource intensive applications will not interfere with mission critical transaction processing. Replication can be either complete or partial. During complete replication all records are copied from one destination to another, while during partial replication, only a subset of data is copied, as specified by the user or the program. Replication can also be done either real-time or on-demand (i.e., initiated by a user, program or a scheduler). The following might be possible if databases are replicated on alternate server(s): better availability or recoverability of distributed applications; better performance and reduced network cost, particularly in environments where users are widely geographically dispersed; etc.

Synchronization Services perform the transactions required to make one or more information sources that are intended to mirror each other consistent. This function may especially valuable when implementing applications for users of mobile devices because it allows a working copy of data or documents to be available locally without a constant network attachment. The emergence of applications that allow teams to collaborate and share knowledge has heightened the need for Synchronization Services in the execution architecture.

The terms Replication and Synchronization are used interchangeably, depending on the vendor, article, book, etc. For example, when Lotus Notes refers to Replication, it means both a combination of Replication and Synchronization Services described above. When Sybase refers to Replication it only means copying data from one source to another.

Implementation Consideration

Replication/Synchronization Services are sometimes supplied as part of commercial databases, document management systems or groupware products such as Lotus Notes, Microsoft Exchange, Oracle, etc.

With Windows 95 and Windows NT 4.0, Microsoft has also introduced the concept of Replication/Synchronization Services into the operating system. Through the briefcase application users can automatically synchronize files and SQL data between their Windows PC and a Windows NT server. Underlying this application is the user-extensible Win32 synchronization services API which can be used to build custom synchronization tools.

Are changes in data usage anticipated?

Data can be dynamically changed to accommodate changes in how the data is used.

Is it desirable to shield the user from the data access process?

A replicated database often consolidates data from heterogeneous data sources, thus shielding the user from the processes required to locate, access and query the data.

What are the availability requirements of the system?

Replication provides high availability. If the master database is down, users can still access the local copy of the database.

Is there a business need to reduce communication costs?

Depending on the configuration (real time vs. nightly replication, etc.), there is a potential to reduce communications costs since the data access is local.

Is scalability an issue?

With users, data, and queries spread across multiple computers, scalability is less of a problem.

Can users benefit from the increased performance of local data access?

Access to replicated data is fast since data is stored locally and users do not have to remotely access the master database. This is especially true for image and document data which cannot be quickly accessed from a central site. Making automatic copies of a database reduces locking conflicts and gives multiple sets of users better performance than if they shared the same database.

Product Considerations

What is the current or proposed environment?

Platforms supported as well as source and target DBMS should be considered.

enables the data access method to be changed at runtime (e.g. batch mode, online mode or Request Batcher).

The Stream-Based Communication pattern can be used to stream the business object's data to the handler. The stream can then be either forwarded to a Request Batcher or can parsed and sent to database.

Individual Persistence

FIG. **163** illustrates a flowchart for a method **16300** for organizing data access among a plurality of business entities. Data about a user is retrieved and packaged into a cross-functional data object in operation **16302** and **16304**. A request for data is retrieved from one of a plurality of business objects in operation **16306**. In operation **16308**, the business object are directed to the data object such that the business object retrieves the entire data object. The business object also selects the data from the data object.

Both locking and integrity may use a uniform mechanism. The business object may retrieve account, customer, and bill-related data from the data object. Also, the business objects may be able to update themselves independently of each other.

Optionally, new business objects may take advantage of existing data access routines. Also, each business object may use a uniform access architecture.

Create a data access architecture that supports reusable, independent business objects in the context of atomic, functionally-specific transactions.

A business unit of work, or business transaction, typically acts on multiple business entities. But for each individual entity, the transaction might only display and update a few data attributes.

For example, accepting bill payment over the phone might use the account number, customer name, amount due, date due, and credit card number. The transaction could therefore avoid accessing many attributes of the account, customer, or monthly bill entities. This might naturally lead to a data architecture which only fetches required attributes, based on the transaction's needs.

Indeed, a traditional client/server program retrieves data in a piecemeal fashion. In this case, the example program would typically allocate a single record to fetch and store the required data items. Then, an "accept bill payment" data access module would fill this structure. This couples data access to processing function.

FIG. **164** illustrates retrieving data piecemeal.

This traditional style of data access may seem flexible. After all, developers can grab whatever data they need for a particular business transaction.

But such access is very unstructured. Different pieces of a cohesive account entity, for example, scatter across multiple windows. Some windows will use the account's effective date; others will not.

This also introduces redundancy. Retrieving the date requires determining the correct database, table, column, and type declaration. Yet another developer who needs this date, for a different data set, duplicates the effort. This does not encapsulate changes, thereby raising costs for testing, maintenance, and extension.

Moreover, each transaction must hand-craft its own retrieval procedure. Creating the thousandth new business transaction would require creating a thousandth new access module. Yet all data items would already have been retrieved by other modules. This style of data access is not reusable.

Finally, business entities are typically less likely to change than the transactions, or processes, which act on those entities. For example, an enterprise might re-engineer its billing function. Regardless of the resulting process, the account, customer, and monthly bill objects would likely remain. This suggests that transaction-based data access is brittle.

Therefore, data access should be organized around business entities, rather than transactions. Individual Persistence packages data into cross-functional objects, rather than transaction-specific data structures. Each individual business object, instead of the window or application, manages the retrieval of its data items.

A business object provides public methods for accessing, comparing, displaying, and setting that data. Developers can therefore no longer plunder the persistent store, selecting data items at will. Instead, they must access their data through encapsulated, self-requesting business objects.

With this architecture, the example billing function retrieves account, customer, monthly bill, and bill payment objects.

FIG. **165** illustrates the manner in which the present invention retrieves whole objects **16500**.

For reuse, business objects should be able to request and update themselves independently of each other. Separating the data access for customer and account objects supports reusing them in isolation. Objects should therefore avoid explicitly requesting other linked objects, unless a formal containment relationship exists.

Finally, separation of concern allows business objects to remain blissfully unaware of the transactions which use them. A business object will not know which data items or services it may need to provide to its clients. Thus, the object must bring back all its data.

Benefits

- Reuse. New transactions can take advantage of existing data access routines. For example, introducing a new business transaction, like perform credit check, would use existing customer and account objects. Yet, these domain model objects would already know how to update themselves. Therefore, the new application would build no new data access code.
- Maintainability and extensibility. This approach supports "fix in one place." Any changes to particular data elements only need to be changed, tested, and recompiled in one access module, that of the owning business object.
- Uniformity. Both optimistic locking and referential integrity (RI) are typically defined at the business object level. For example, separate account and customer objects typically have their own locking attributes. In addition, an RI rule usually relates one entity to another, such as "all accounts must have a customer." Organizing data access around business entities simplifies locking and integrity. Both can use a uniform mechanism, implying that the architecture can hide technical details. This avoids the hard-coding typical of the transaction-based approach.
- Flexibility. Whole object retrieval is extensible. It allows a transaction to ask an object for any data. This supports maintenance and extension. A developer can easily change the particular data items a transaction uses. But whole retrieval still guarantees that those items will already have been retrieved. For example, a future release of the accept bill payment window could also display the social security number. Yet the data access routines would need no modification.

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Warshavsky et al.

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(54) **METHOD AND APPARATUS FOR MAPPING BETWEEN XML AND RELATIONAL REPRESENTATIONS**

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(21) Appl. No.: **09/835,162**

(22) Filed: **Apr. 13, 2001**

(51) **Int. Cl.**[7] **G06F 17/30**
(52) **U.S. Cl.** **707/5**; 707/4
(58) **Field of Search** 707/1, 2, 3, 4, 707/10, 103, 202, 200, 104.1, 513, 100, 101; 709/203, 229

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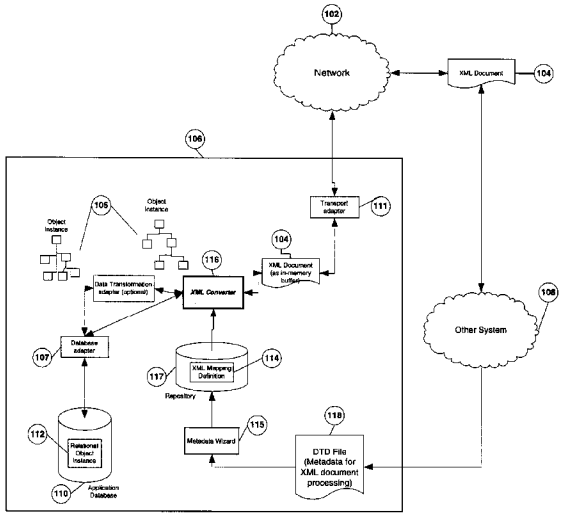
(57) **ABSTRACT**

A method to convert data between a relational format and an XML document, by creating a set of XML Mapping Definition from metadata; selecting relational data from a relational application database, and converting the relational data to the XML document using the set of XML Mapping Definition.

19 Claims, 4 Drawing Sheets



Partial Timeline

October 20, 1999 – utility patent application that is a continuation in part of seven previously filed patent applications is filed. The patent application is assigned application serial number 09/421,553 and is assigned to Frantzy Poinvil in art unit 2164.

April 13, 2001 – Alex Warshavsky and others from the Siebel Corporation file a utility patent application for a method and apparatus for using metadata mapping to convert data from an xml to relational format and from a relational format to an xml format. The patent application is assigned serial number 09/835,162 under class 707.

August 29, 2001 – a continuation to 09/421,553 is filed. The patent application is assigned application serial number 09/940,450 and is assigned to Clement Graham in art unit 3628.

April 3, 2003 – The file for application serial number 09/421,553 is marked lost at the U.S.P.T.O.

December 7, 2003 – A fax sent to Clement Graham regarding 09/940,450 was lost at the U.S.P.T.O.

December 19, 2003 – An amendment/reply sent in response to a November 24, 2003 Office Action for 09/940,450 was lost at the U.S.P.T.O.

January 16, 2004 – 16 pages of a supplemental amendment/reply for 09/940,450 were lost at the U.S.P.T.O.

February 3, 2004 – The file for application serial number 09/421,553 marked found at the U.S.P.T.O.

May 4, 2004 – Application 09/835,162 matures into patent 6,732,095.

April 2, 2005 – The missing fax from December 7, 2003, the missing amendment/reply from December 19, 2003 and the missing 16 pages of the supplemental amendment/reply from January 16, 2004 were re-submitted to the U.S.P.T.O.

May 3, 2006 – Clement Graham mails an Office Action for 09/940,450 (2 years and 4 months after response was first received to the November 24, 2003 Office Action)

May 4, 2006 – Two year anniversary of the issuance of 6,732,095

October 22, 2006 – Appeal brief filed for 09/940,450

April 10, 2007 – notice of non-compliant appeal brief mailed by Frantzy Poinvil

11. Related Proceedings Appendix: **None**